Against the Grain

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Standards Column - Journal Article Supplementary Materials: A Pandora's Box of Issues Needing Best Practices

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around for a technology to save them from this awful predicament.

They tried Quadraphonic. What a deal! Stone Age Surround Sound: four speakers — twice the circuitry in the amp, all new tape decks and even quadraphonic LPs. Expensive to produce. Expensive to buy. Difficult to bootleg (not everyone had a **Teac** four channel reel to reel in their living rooms). Well, nobody bought 'em.

So the impasse continued until the advent of the optical compact disc. Now that was really something! A reassertion of the album — and so much better technically that even if folks made a cassette copy, it was clearly inferior in quality — and nobody'd be able to make a duplicate of an optical disc: the very idea: a writable optical disc in the hands of the masses? Hah! Not in our lifetimes!

Well, even our younger contemporaries have some idea how this turned out. Not only did writable optical discs become ubiquitous, but multiple formats for the re-sampling, transport, and storage of the content became ubiquitous as well — and with them, a new meaning for a couple of old words: Ripped, and Burned.

And there's the End of the Album once again. But musicians are still making music, music lovers are still listening to music and everybody's happy — except Big Content.

But now even Big Content is learning to cope. Let me do a shout out (so popular these days) to the **Zune** Pass. Have you checked it out? It's DRM, but it's DRM that works, and works great.

For $14.95 per month membership, renewed every three months, I have access via my **Zune** HD player to the entire **Zune** music catalog. Everything. Download it, listen to it on any of three devices registered to my account, keep it as long as I like, as long as I'm a member. In addition, each calendar month I have ten credits good for individual track purchases. The application of one of these credits to a track already downloaded has the result of removing the DRM.

Once purchased through the application of a credit,my rights associated with that track (visible in the properties box) change from "DRM: Yes — license expires xx/xx/xxxx (has sync rights, no burn rights)" to "DRM: No".

If I quit the Pass program, sell my **Zune**, and move to Igiagik, I still have personal Sync, Play, and Burn rights to that track. If I tire of the track while it's still under DRM, I can simply delete it from my Collection. If I don't renew my membership in the **Zune** Pass program, the DRM system simply lets my rights expire in place — the track just melts away.

The most surprising thing about this system is the way it has increased the diversity and amount of music I'm discovering through the catalog. For example, if I'm listening to the FM radio on the **Zune** and hear a track I like, I can hit the shopping cart on the player's little touch screen, and the next time the player has Internet access (either through the sync function with my personal computer or via its own Wi-Fi capabilities), it will download the track, if available, from the **Zune** catalog and add it to my collection. I don't even have to know the name of the artist or song — I just have to say, in effect, "I kind of like that one..."

In short, the **Zune** Pass system is increasing the number of tracks that I'm discovering, downloading, and, yes, purchasing. The range of musical types in my collection is becoming more diverse. I'm hitting more and different neighborhoods in the corpus of the world of published music, and buying more music — directly as a result of the enlightened combination of openness, ease of access, and try-before-you-buy DRM.

It should be readily obvious that such a system would work perfectly well in the arena of the published word.

So here's the recipe:

Instead of taking the Neanderthal, ossified subscription models imposed by Big Content on our schools and libraries and trying to make it fit on the small screen of the **Kindle** or the **Sony Reader** or the **Nook**, or whatever player-de-jour comes along, look at it from the individual customer's perspective. He/She would like to browse. Give them the digital equivalent of the comfy chair in the bookstore. Let them read. If they like it, make it easy for them to buy it.

If they subscribe, let them read anything they like. Let them keep what they want and return the rest. Give them an onscreen button to say, "OK — I really like this one: please send me the hardbound edition. You have my credit card. Just send the book, please, and I'll love you all the more for making it so nice and easy. Thanks."

Offer students textbook subscriptions, complete with updates and embedded hot links to related content.

Finally, make this whole system work through the libraries of the world. Let the readers browse. Let them borrow, and give the individual library they've associated a reader with a small commission for serving as the middleman. If they buy the hard copy, give the library a cut of that, too. If they want to "return" the book, just tell the DRM system to let it expire in place; just melt away.

Just do all this, please, and don't listen to anyone who's running around saying Authorship is Dead, Publishing is Dead, Reading is Dead, etc, etc, etc. Here's where we get back to working for a living.

Dry your eyes, pick yourself up, dust yourself off, and try again.

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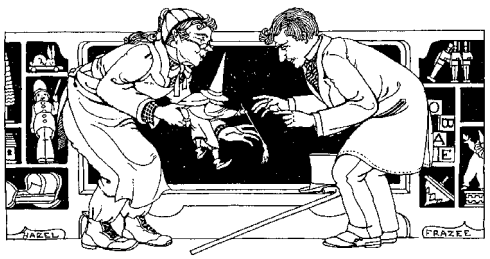

The notion of what constitutes a journal article has traditionally been fairly straightforward. When we think of an article, many of us picture that linear text item found in a magazine or journal. As articles are increasingly distributed in electronic form, however, the opportunity arises to easily provide additional content and data supporting what we have typically considered an "article" — opening a Pandora's box of management issues. With print journals, the occasional additional content was first provided on CD-ROM disks. With the transition to electronic journals, these materials — which are lumped into the overarching term "supplemental materials" — can include items as diverse as presentation slides, supporting data sets, data analysis tools, dynamic visualizations, videos or animation of experiments, or audio. Even the term "supplementary" may be inaccurate, since in some fields this additional material may, in fact, be critical to understanding the article, such as in fluid mechanics where visual representations are often the best way to convey experimental results.

One of the practical limitations on print journal content has always been page count — that is, the number of cumulative pages in an issue — which has the most direct impact on a journal's production cost; more pages equate to increased costs during the review, editing, layout, printing, and distribution stages. In an electronic environment, the costs of distribution are seemingly negligible and the costs for storage of extra bytes of information are increasingly minor. Supplementary materials also require less production since they are frequently used in their original formats (e.g., CSV file, JPEG graphic, MPEG video, etc.), without any need for the traditional editing or layout work. By including these materials in the electronic journal collection, added content and value are obtained at relatively limited

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cost, resulting in improved user experience or understanding.

However, there is a downside. In her recent editorial, "Taming Supplemental Materials" (in *Cell,* Volume 139, Issue 1, 2 October 2009, Page 11; available online at *http://www.cell.com/issue?pii=S0092-8674(09)X0020-6*), **Emilie Marcus**, Editor-in-Chief of *Cell*, describes the many drawbacks surrounding supplemental materials. She identifies authors' concerns about being compelled to include data, either by their self-imposed expectations from peers or to address questions arising from the review process. Similarly, she continues, reviewers are compelled — from concerns for comprehensiveness and possibilities of incorrect or falsified data — to review not only the paper, but the underlying data as well. She ends by stating: "As with the paper itself, which has over time evolved a reasonable agreed upon standard and structure, it seems time to begin to define a similarly accepted standard for supplemental materials."

A recent note posted to the **CrossRef Technical Working Group** list by **Sasha Schwarzman** at the **American Geophysical Union (AGU)** outlined informal survey results he received from several large publishers on their practices regarding publication of supplementary materials. While all of the publishers surveyed were distributing these types of materials, there was little consistency in how they were handled. There was consensus in the view that all supplemental materials should be peer-reviewed, but not necessarily about the rigor of that review. The size and scope of the supporting materials was an issue, as well as if and where those materials reside online. Publishers generally responded that supplemental materials did not go through the same production processes, such as editing, layout, consistent markup, etc. While ensuring that the supporting data remained intact and unchanged, this lack of production management could lead to problems when a publisher wants to archive the information or migrate it to a future system. Although **Schwarzman** concedes that it is unlikely to achieve consensus across publications about what even constitutes "main" and "supporting" materials, consistent criteria needs to be stipulated per title (or per publisher if the policies are consistent across all titles), and that publishers' submission systems could help reinforce those policies.

Tied to these questions about supplementary items is the issue of managing non-print materials that are not supplementary, but instead are part of the core journal article. There are many examples of multimedia articles that don't have print counterparts. A very quick search of the **arXiv.org** (*http://arxiv.org/*) repository found the following item: *Nanodroplet Impact on Solid Platinum Surface: Spreading and Bouncing* (*http://arxiv.org/abs/0911.0033*), by **D. T. Lussier** and **Y. Ventikos**. This item is a video that was also submitted to the **Gallery of Fluid Motion 2009** (*http://www.aps.org/units/dfd/videos/index.cfm*), an annual showcase of fluid dynamics videos published by the **American Physical Society** (*http://www.aps.org/*). While a descriptive text is included, the video is really the critical part of the communication of the experiment — a part that cannot be equally conveyed in text. Discovery of this video "article" is one of the management issues, as is the case with most non-print materials. For instance, although the PDF description that accompanies the video provides some searchable (though not controlled) metadata about the content of the video, there is no associated metadata related to the video file structure, viewing requirements, production specifications, etc. Other issues that need to be addressed are archiving and citation. Because **arXiv.org** has a robust archiving structure, this particular work is more likely to be preserved and citation information is included with the main record for the material, but that may not always be the case.

Another site, **eFluids** (*http://www.efluids.com/*) is a portal for content related to fluid dynamics, linking to and hosting content "for anyone working in the areas of flow engineering, fluid mechanics research, education and directly related topics." Although not strictly scholarly, it hosts content from a variety of research labs, similar to those posting on **arXiv.org**. In many cases, the video content is integrated from **YouTube** postings, which hardly matches the rigor or archiving capability of **arXiv**. One example video on the site, *Wake of a low aspect ratio pitching plate, St = 0.64* (*http://media.efluids.com/galleries/all?medium=337*), by **James Buchholz** and **Alexander Smits**, is related to an article ("On the evolution of the wake structure produced by a low-aspect-ratio pitching panel" [2006], 546:433-443, available at *http://journals.cambridge.org/action/displayAbstract?fromPage=online&aid=362402&fulltextType=RA&fileId=S0022112005006865*) by **Buckholz** and **Smits** from the *Journal of Fluid Mechanics* (*http://journals.cambridge.org/action/displayJournal?jid=FLM*), published by **Cambridge University Press** (*http://journals.cambridge.org/action/home*). It is unclear from the site, however, whether the video is *directly* tied to the referenced article, since no link or further information is supplied. Although this particular video on **eFluids** provides a journal article reference (but no Website or URL reference), many other videos on the site lack any references or additional contextual material other than a brief description, some of which note that the videos are from government-funded research and are clearly scholarly. Perhaps the results have been published elsewhere or perhaps the experiments have not yet been included in a published work, but it very difficult to tell from the provided information. This is a clear example where some best practices for distributing such multimedia material in advance of or in addition to peer-reviewed literature would be useful.

There are several ongoing initiatives hoping to address some of the questions related to management of supplemental materials. The **Optical Society of America (OSA)** has partnered with the **NIH National Library of Medicine** to provide an environment for users to interact with scientific data sets. This **Interactive Scientific Publishing (ISP)** (*http://www.opticsinfobase.org/isp.cfm*) project "allows authors to publish large 2D and 3D datasets with original source data that can be viewed and analyzed interactively by readers." The **International Council for Scientific and Technical Information (ICSTI)** is working on two projects related to non-textual articles (*http://www.icsti.org/projects.php*): Multimedia Search and Retrieval, and Interactive Journal Articles. In February, they will also host the workshop "Interactive Publications and the Record of Science" (*http://www.icsti.org/programme_winter2010.php*) in Paris. The goal of this meeting is to "survey the most exciting and challenging of the new developments [in interactive publications] and to begin to identify the necessary infrastructure for including interactive content within the record of science." Registration is open to members and non-members of **ICSTI**.

In light of this situation and in reaction to the apparent community needs, **NISO** and **NFAIS** are organizing a roundtable discussion in January 2010 in Washington, DC to discuss the need for more standardized bibliographic and publishing policies for supplemental journal material. One possible outcome of this meeting would be for a group of interested parties to draft a new work proposal to undertake a best practice project on supplementary materials. Among the topics that will be discussed at the meeting are:

- What are "supportive" materials versus "core" materials for an article?
- How should supplemental content be identified and described?
- What are the preservation expectations of the supplemental materials with respect to the article's preservation?
- What are the existing metadata and citation practices for supplemental materials and the gaps in current practices?

A report of the roundtable and agreed upon next steps will be published on the **NISO** Website shortly after the meeting.

Publication oddities have always presented problems for traditional publishing, cataloging, indexing, and citation structures. However, these problems are usually outliers managed by the reality of their infrequency. Supplementary materials were initially such an outlier, but are now appearing with increasing frequency and can no longer be effectively managed on a case-by-case basis. Ensuring discovery, access, and preservation of these materials is in the interests not only of the authors and publishers, but also the library community and end-users alike. Many individuals and organizations in these communities have been speaking up about the problems; solutions, however, are still in the early discussion and experimental stages.